ABSTRACT OF THE DISCLOSURE

Highly active, recoverable and recyclable transition metal-based metathesis catalysts and their organometallic complexes including dendrimeric complexes are disclosed, including a Ru complex bearing a 1,3-dimesityl-4,5-dihydroimidazol-2-ylidene and styrenyl ether ligand. The heterocyclic ligand significantly enhances the catalytic activity, and the styrenyl ether allows for the easy recovery of the Ru complex. Derivatized catalysts capable of being immobilized on substrate surfaces are also disclosed. The present catalysts can be used to catalyze ring-closing metathesis (RCM), ring-opening (ROM) and cross metatheses (CM) reactions, and promote the efficient formation of various trisubstituted olefins at ambient temperature in high yield.